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Room Louis Weil - E424 (3rd floor, building E) - 25 rue des martyrs [\[Access Map\]](#)

Alliance 5 “Supra”



FERMI-SURFACE RECONSTRUCTION

BY CHARGE ORDER IN CUPRATE SUPERCONDUCTORS

Summary :

Since the discovery of quantum oscillations in 2007, we know that the Fermi surface of the underdoped cuprate superconductor YBCO undergoes a reconstruction at low temperature. A signature of this reconstruction is the change of sign in the Hall and Seebeck coefficients, which become negative at low temperature. Observed in other hole-doped cuprates, this phenomenon is generic. By analogy with Eu-LSCO, where charge modulations are responsible for the reconstruction, a similar mechanism was inferred for YBCO. Charge modulations in YBCO have since been observed directly by NMR and X-ray diffraction. Charge order has also been observed in other materials – it represents a central new fact in the physics of cuprates.

We have used electrical, thermal and thermo-electric transport measurements in high magnetic fields to investigate the Fermi-surface reconstruction in YBCO and its impact on superconductivity. Based on our recent observation of a hole-like pocket in the Fermi surface of underdoped YBCO, I will argue that both charge order and the pseudogap play a role in the reconstruction. We have mapped out the upper critical field H_{c2} as a function of doping across the phase diagram and find a dramatic drop in H_{c2} below a critical doping $p = 0.18$. This shows that phase competition is what shapes the T_c dome in hole-doped cuprates.